



"Revised"

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**Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program**

Institution Submitting Proposal: Mount St. Mary's University

Each action below requires a separate proposal and cover sheet.

- Radio button options for: New Academic Program, New Area of Concentration, New Degree Level Approval, New Stand-Alone Certificate, Off Campus Program, Substantial Change to a Degree Program, Substantial Change to an Area of Concentration, Substantial Change to a Certificate Program, Cooperative Degree Program, Offer Program at Regional Higher Education Center.

Payment: Yes (checked) / No; Payment Type: Check # 27541; Payment Amount: \$250.00; Date Submitted: 021825

Department Proposing Program: Math and Computer Science; Degree Level and Degree Type: Upper division certificate; Title of Proposed Program: Computational Technology; Total Number of Credits: 18; Suggested Codes: HEGIS: 799.00, CIP: 30.3001; Program Modality: Both (checked); Program Resources: Using Existing Resources (checked); Projected Implementation Date: Fall (checked), Year: 2025; Provide Link to Most Recent Academic Catalog: URL: https://catalog.msmary.edu/?_gl=1*1v76jr4*_gcl_au*ODI0NTY5MjMuMTczNzk4NjIwOA..

Preferred Contact for this Proposal: Name: Christine McCauslin, Ph.D.; Title: Dean, School of Science, Mathematics & Technology; Phone: (301) 447-8399; Email: mccauslin@msmary.edu

President/Chief Executive: Type Name: Gerard J. Joyce, Ph.D.; Signature: [Handwritten Signature]; Date: 2/28/2025; Date of Approval/Endorsement by Governing Board:

Revised 1/2021



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February 14, 2025

Sanjay K. Rai, Ph.D.
Secretary of Maryland Higher Education
Maryland Higher Education Commission
6 North Liberty Street
Baltimore, MD 21201

Dear Dr. Rai,

On behalf of Mount St. Mary's University, I am submitting to you proposals for a **new Bachelor of Science program** and an **undergraduate certificate** in Computational Technology. Mount St. Mary's is seeking approval from the Maryland Higher Education Commission to offer these programs through the School of Science, Mathematics, and Technology.

Enclosed, you will find the complete proposals and cover sheet for your review. A check in the amount of \$1,100.00, representing the required fees (\$850 for the new degree program and \$250 for the new stand-alone certificate), is being sent under separate cover to the attention of Collegiate Affairs, Maryland Higher Education Commission.

Thank you in advance for your timely consideration of these proposals. I look forward to hearing from you.

Sincerely,

Boyd Creasman, Ph.D.
Provost

Undergraduate Certificate in Computational Technology



Proposal for a New Undergraduate Certificate Program in Computational Technology

A. Centrality to Institutional Mission and Planning Priorities

1. Provide a brief description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.

An undergraduate certificate in Computational Technology is proposed within the Department of Mathematics and Computer Science at Mount St. Mary's University. The certificate is designed to build computational technology skills for a broad target audience crossing multiple discipline areas. Computational technology is relevant across a spectrum of subject areas, and individuals within any discipline would benefit professionally from developing some level of computational technology expertise. While certification and training can be found in online forums in specific disciplines, the proposed certificate will focus on mathematical problem-solving skills using multidisciplinary computational technology methods. Those who complete the certificate will have gained critical computational technology expertise that can be utilized immediately within their current career paths. The certificate is being proposed along with a major in Computational Technology. The certificate will utilize courses in the proposed major, along with existing MSMU courses. The curriculum will heavily leverage interdisciplinary applications.

The certificate can be completed online, using courses offered through MSMU's Division of Continuing Studies (DCS), and thus will be an appealing option for undergraduate DCS students. Students at MSMU's main campus who are not already majoring in a computational technology area are also able to complete the certificate through a combination of existing in-person, on-campus classes and proposed online DCS courses. Within the certificate curriculum, the first three courses are designed to provide a critical, common foundation in key mathematical, computing and statistical concepts. Two additional courses allow students to develop additional computer science, data science, and mathematical modeling skills. A concluding application course demonstrates real-world utilization of computational technology skills: students can take an existing course within their major that utilizes computational technology or can take a new course, the proposed Capstone in the Computational Science major, to create a personalized experience that crosses a variety of disciplines of interest.

With the explosion of data and computing across industry, service, government and research organizations, the demand for employees with a background in computational technology is equally widespread across a diverse discipline spectrum. The need for individuals who have knowledge of their subject area as well as knowledge of the means to use computational technology to leverage the vast quantity of data related to that subject area to support decision-making processes has become critical.

Undergraduate Certificate in Computational Technology



According to the 2016 US Census¹, Frederick County, Maryland is among the fastest growing suburbs of the Baltimore-Washington metropolitan area, projected to grow 38% beyond current census by the year 2040. Employers within the county include government, research, and financial spectrums as well as many startup high technology companies including biotechnology and cybersecurity. The proposed Computational Technology certificate is an augmentation to the student's educational and career experiences, which will benefit the Frederick County area and beyond. This certificate will be beneficial for those who do not intend to pursue data science or computer science as a career direction, but simply desire to be knowledgeable related to the intersection of mathematical problem solving, data science, and computing, and its potential utilization within their career.

The proposed program is designed to be consistent with and to support the University's mission:

Mount St. Mary's is a Catholic institution of higher education dedicated to liberal learning in the pursuit of truth. Mount St. Mary's, mindful of its role in the Church's mission to the world and respectful of the religious liberty of all, affirms the values and beliefs central to the Catholic vision of the person and society, and seeks to deepen understanding of our faith and its practice in just and compassionate engagement with the world.

As a testament to the university mission, MSMU has a long-standing history of offering curriculum, including technology curriculum, within a structure of smaller, student-focused, class sizes, fully integrated within an ethics-focused framework. The proposed certificate program builds on this success to empower participants to develop skills and insights necessary to be ethical leaders empowered with computational technology skills within their individual professions. Participants of the certificate program will develop as computational technology literate professionals well-prepared to function analytically, professionally, and ethically within a high technology world.

As computational technology solutions continue to grow in their importance to the world's issues, it is imperative that universities like Mount St. Mary's University participate in the preparation of professionals who "see and seek to resolve the problems facing humanity and commit themselves to live as responsible citizens." Participants who successfully complete the certificate program will think intellectually as well as morally related to the utilization of computational technology. The program will develop not only the technical skills but will challenge participants to never lose sight of the ethical implications of computational technology.

¹ https://www.fredericknewspost.com/news/economy_and_business/real_estate_and_development/census-estimates-frederick-county-population-keeps-growing/article_63be74c5-8081-5064-89f8-ad8846e51929.html

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2. Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.

The certificate in Computational Technology supports numerous strategic priorities and goals of the 2018-2025 Mount St. Mary's University Strategic Plan. Student Success is a priority of the strategic plan. More specifically, the Mount "prepares a diverse student body to be ethical leaders who lead lives of significance in service to God and others. We do this by immersing students in a rigorous intellectual, social and spiritual experience, grounded in the Catholic intellectual tradition. The Mount prepares graduates for excellence in their lifelong pursuits through cultivating a zeal for learning." The certificate in Computational Technology is consistent with the Student Success priority of the Mount, as it offers, for the first time, a technical certificate in the Division of Continuing Studies. As a result of carefully crafted and complementary courses in mathematics, computer science, and data science, students will develop a variety of skills and mind-sets that will allow them to contribute to teams, bridge disciplines, and tackle real-world problems. With the robust core curriculum and thoughtful inclusion of ethical issues in technology, those who earn the certificate with their chosen major will be grounded in the necessary skills and mindset to emerge as ethical leaders in their chosen fields, as well as manifest a curiosity in our world that can be explored through the use of technology.

The Mount's Strategic Plan also includes a goal to "develop new academic programs and systematically review existing programs in order to meet the needs of society." Regionally and statewide there is a demand for employees with knowledge in specific disciplines as well as computational technology skills; the certificate in Computational Technology will help fill this need.

3. Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L.)

Mount St. Mary's University is committed to adequately funding the proposed certificate for at least five years. The established Center for Instructional Design and One Button Studio will provide training and resources for online course development and maintenance, while the Information Technology Support Center will provide technical support. There are no specific hardware or software needs. Current faculty members have the expertise to fully teach the new certificate. Many courses are already offered as part of faculty teaching load. Additional courses will be taught by adjunct instructors.

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4. Provide a brief description of the institution's commitment to:

a. Ongoing administrative, financial, and technical support of the proposed program.

This new certificate in Computational Technology will receive administrative support from the Chair of the Department of Mathematics and Computer Science, the Dean of the School of Natural Science and Mathematics, the Associate Provost for the Division of Continuing Studies, as well as the Provost and President. The Chair and Dean work closely with the faculty and Boards of Advisors to enact a mission and vision that aligns to the University mission and strategic plan. The Chair will collect and analyze data from key assessments as well as staffing. Three administrative assistants, one assigned to the school, one assigned to the department, and one assigned to the Division of Continuing Studies, will provide the administrative support necessary for the program.

b. Continuation of the program for a period of time sufficient to allow enrolled students to complete the program.

The Department of Mathematics and Computer Science is home to three tenured professors, seven assistant professors, and one endowed professor. Most faculty have Ph.Ds. in mathematics, computer science, or data science. The department has a long history of graduating students and has done very well offering new programs in the last 10 years. Moreover, the President's signature on the proposal cover sheet indicates the University's confidence of the program's viability. University procedures for the discontinuation of programs, when necessary, include the preparation of teach-out plans and individual student program plans to ensure enrolled students have a pathway for program completion.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

1. Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:

a. The need for the advancement and evolution of knowledge.

The U.S. Bureau of Labor Statistics² states that, "Employment of computer and information research scientists is projected to grow 23 percent from 2022 to 2032, much faster than the

² <https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm>

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average for all occupations.” In addition, EAB³ (formerly Education Advisory Board) forecast released in 2024 lists Project Management, Computer Science, Data Analysis, and Python as four of the top ten most sought job skills in Maryland in 2023. These skills are all part of the proposed certificate.

b. Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education.

The initial motivation for the Computational Technology major comes from a desire to provide pathways for economically disadvantaged students to complete degrees at a private, four-year college in a STEM field. In particular, the major aims to present pathways for community college students to transfer to a private four-year college in a completely online program, so there are no additional housing costs. This certificate allows students majoring in a variety of fields to develop both skills in their chosen field and the most in-demand computational technology skills.

c. The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs.

Not Applicable

2. Provide evidence that the perceived need is consistent with the Maryland State Plan for Secondary Education

The certificate in Computational Technology is consistent and in alignment with all priorities of the Maryland State Plan. These include Access (Ensuring equitable access to affordable and quality post-secondary education for all Maryland residents), Success (Promoting and implementing practices and policies that will ensure student success), and Innovation (Fostering innovation in all aspects of Maryland higher education to improve access and student success).

Access: The certificate in Computational Technology affords access by ensuring equal educational opportunities for all Marylanders. Mount St. Mary's University will individually work with each student to construct a completion plan that aligns their previous course work, if any, and their goals and financial resources. By offering an online asynchronous certificate pathway, students are able to add a certificate acknowledging their technical skills without paying for campus housing and in a way that is flexible with other demands, such as a job or caregiving.

Success: The certificate in Computational Technology will meet the needs of both traditional and non-traditional students by providing them with an opportunity to complete an asynchronous online STEM certificate grounded in the Catholic intellectual tradition. This certificate in Computational Technology addresses skill shortages in a variety of fields. Students in the program

³ EAB. (2024). *Employer Demand Profiles*. EAB. Retrieved from <https://eab.com/resources/tool/us-employer-demand-profiles/>.

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will be supported in their studies through our Center for Student Success and Learning Services and in a career pathway that is enriched by professional development through our Career Center.

Innovation: The certificate in Computational Technology is an innovative blend of mathematics, computer science, and data science that will provide each student with a foundational understanding of mathematical problem solving while providing technical skills in Python and R that students can use in their chosen discipline.

C. Quantifiable and Reasonable Evidence and Documentation of Market Supply & Demand in the Region and State

1. Describe potential industry or industries, employment opportunities, and expected level of entry for graduates of the proposed program

The initial motivation for the Computational Technology major comes from a desire to provide pathways for economically disadvantaged students to complete degrees at a private, four-year college in a STEM field. In particular, the major aims to present pathways for community college students to transfer to a private four-year college in a completely online program, so there are no additional housing costs. The certificate allows for students from a variety of backgrounds to gain the most in-demand technical skills that employers are looking for. The certificate provides a pathway to add credentials to a traditional undergraduate or to an on online degree at MSMU. In addition, the certificate gives an opportunity for adult learners to add STEM credentials to their degree.

2. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program

The U.S. Bureau of Labor Statistics⁴ states that, “Employment of computer and information research scientists is projected to grow 23 percent from 2022 to 2032, much faster than the average for all occupations.” In addition, EAB⁵ (formerly Education Advisory Board) forecast released in 2024 lists Project Management, Computer Science, Data Analysis, and Python as four of the top ten most sought job skills in Maryland in 2023. These skills are all part of the proposed certificate.

3. Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.

⁴ <https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm>

⁵ EAB. (2024). *Employer Demand Profiles*. EAB. Retrieved from <https://eab.com/resources/tool/us-employer-demand-profiles/>.

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Research for the certificate in Computational Technology is very promising and suggests there is both a regional and national need for graduates in this area. The data for the state of Maryland provided by Gray & Associates suggest that data analytics/data science, which includes skills of data science, programming, and problem solving, is in the 85th percentile for job postings over the past 12 months, the 86th percentile in the Bureau of Labor Statistics in current employment, and the 87th percentile for the BLS report on annual job openings. This data—when combined with the projected growth—suggest that this certificate in Computational Technology is both timely and in demand.

4. Provide data showing the current and projected supply of prospective graduates.

EAB⁶ (formerly Education Advisory Board) forecast released in 2024 lists Computer Science, Data Analysis, and Python as three of the top ten most sought job skills in Maryland in 2023. These skills are all part of the proposed certificate. The Computational Technology certificate gives students technical skills across multiple disciplines and a mathematical problem-solving background that they can apply in their chosen field.

D. Reasonableness of Program Duplication

1. Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.

The proposed certificate program is distinctive from the similarly titled Scientific Computation Certificate program offered by University of Maryland College Park (UMCP). Most notably, the UMCP program is a graduate certificate program and only available to students who are currently enrolled in a graduate program at UMCP. In contrast our proposed certificate program is intended for delivery to undergraduate students. In addition, the program is offered in an online format, is broadly accessible, and is open to both traditional and non-traditional students. In this way, it allows students pursuing bachelor's degrees to enhance their computational skills thereby strengthening workforce preparation.

2. Provide justification for the proposed program.

The development of a certificate in Computational Technology is well supported, not only through externally acquired data from EAB, but also through internal elements such as the support of the preexisting STEM majors and our university's mission. Indeed, the support of an online asynchronous STEM certificate in Computational Technology will also help the university

⁶ EAB. (2024). *Employer Demand Profiles*. EAB. Retrieved from <https://eab.com/resources/tool/us-employer-demand-profiles/>.

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to provide a pathway for prospective students who want to add technical skills to their degree in a different field.

E. Relevance to High-demand Programs at Historically Black Institutions (HBIs)

1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBIs

Not applicable. The proposed program does not duplicate or compete with programs at any of the regional HBIs.

F. Relevance to the Identity of HBIs

1. Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs

Not applicable. The proposed program does not duplicate or compete with programs at any of the regional HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Objectives

1. Describe how the proposed program was established, and also describe the faculty who will oversee the program

The certificate in Computational Technology is designed for students from diverse backgrounds and disciplines with a goal to build on the subject matter expertise within the individual applicant's professional and educational experiences. It is designed to provide participants with the knowledge and skills necessary to contribute at an expanded level within a highly computing-centric world. Participants will develop skills within key technology areas, key computational areas, and key application areas without presumed prior knowledge specific to these areas.

The faculty and administrators responsible for planning, implementation, and evaluation of the certificate in Computational Technology are listed below.

Dean			
Dr. Christine McCauslin	PhD	Biology	Full-time
Associate Provost, Division of Continuing Studies			
Dr. Jen Staiger	PhD	Biology	Full-time
Department Chair			
Dr. Jonelle Hook	PhD	Mathematics	Full-time
Faculty			
Dr. Melanie Butler	PhD	Mathematics	Full-time

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Dr. Matt Gerhart	PhD	Mathematics	Full-time
Dr. Jon McCurdy	PhD	Data Science	Full-time
Dr. Ruth Lamprecht	PhD	Computer Science	Full-time
Dr. Daniel Salinas-Duron	PhD	Data Science	Full-time
Dr. Brian Heinold	PhD	Mathematics	Full-time
Professor Scott Weiss	MS	Computer Science	Full-time
Professor Kevin Rittie	MS	Cybersecurity	Full-time
Dr. Nadun Kulasekera Mudiyansele	PhD	Mathematics	Full-time
Dr. Margaret Leary	PhD	Cybersecurity	Full-time

2. Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and modality of the program

The certificate in Computational Technology is designed to provide key technology and data skills for students from all professional areas to be confident in decision making tied to their subject area data. Completion of the certificate will provide students with:

Proficient Problem Solving

Graduates will demonstrate proficiency in applying mathematical concepts, algorithms, and computational techniques to solve problems in various domains, showcasing the ability to develop innovative solutions using computational thinking.

Data Analysis and Interpretation

Students will acquire the skills to collect, clean, analyze, and interpret large datasets using statistical methods, enabling them to derive meaningful insights and make data-driven decisions.

Effective Algorithm Techniques

Graduates will gain foundational skills in designing algorithms for common computational problems, with an emphasis on understanding their efficiency.

Ethical and Responsible Computing

Graduates will understand the ethical, legal, and societal implications of computational technologies, including issues related to data privacy, algorithmic bias, and data security, and will demonstrate a commitment to responsible computing practices and ethical decision-making in their professional endeavors.

3. Explain how the institution will:

a) provide for assessment of student achievement of learning outcomes in the program

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Each course in the certificate in Computational Technology will have assignments that specifically assess one (or more) of the learning outcomes. Each instructor will provide the appropriate assessment tool with continuous oversight by the Chair of the Department of Mathematics and Computer Science. The Chair and Dean will monitor objectives via assessment data at the course and program levels.

b) document student achievement of learning outcomes in the program

Student achievement of learning outcomes will take the form of key assessments aligned to specific learning outcomes for the Computational Technology certificate and also the learning outcomes for the Department of Mathematics and Computer Science. External validation will also occur through internal and external internships and career placement.

4. Provide a list of the courses with title, semester credit hours and course descriptions, along with a description of program requirements

Course List (6 courses, 18 credits)

Required Courses (5 courses, 15 credits)

Requirement	New Courses	Alternative Courses (existing)
1 – introduction to statistical concepts and R	<p>TECH 200 Data Analysis I This course provides a solid foundation in statistics, including an introduction to R. Sections covered include data collection, data frames, exploratory data analysis, including visual graphs, numerical summaries, and relationships between variables - basic probability, and statistical inference. Topics are taught using real data drawn from various fields, including economics, biology, political science and sports, allowing students to directly connect course material to solutions to real-world problems and to</p>	<p>DATA 200 Introduction to Data Science This course presents an overview of the discipline of data science: its goals, methods, tools, and scope. The R statistical computing environment is used for data manipulation, statistical analysis, and visualization. Ethical issues surrounding data collection and use will be discussed. Prerequisite(s): None.</p>

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**MOUNT ST. MARY'S
UNIVERSITY**

**School of Science,
Mathematics & Technology**

	<p>consider ethical issues surrounding the application of data science to these problems.</p> <p>Open only to DCS students.</p>	
2 – introduction to computer science and Python	<p>TECH 220 Introduction to Python</p> <p>Students will learn concepts of algorithmic thinking through Python programming. Using Python as a tool to solve problems, students will learn about designing, writing, debugging and documenting computer programs, and will consider ethical issues in computer science.</p> <p>Open only to DCS students.</p>	<p>CMSCI 120 Introduction to Computer Science I</p> <p>This is an entry-level course in computer science that covers problem-solving methods and the development of algorithms. Students are taught how to design, write, edit, test, debug and document simple computer programs. Principles of modularity and information hiding, good programming style and elementary data representation are covered.</p>
3 – introduction to mathematical problem solving	<p>TECH 210 Applications of Functions</p> <p>With an emphasis on business and science applications, this course connects math to real world problems. Students will make use of data, graphs, and tables to develop math modeling skills through course projects.</p>	NA
4 – more advanced data science topics	<p>TECH 300 Data Analysis II</p> <p>This course introduces students to obtaining and</p>	<p>DATA 210 Exploratory Data Analysis</p> <p>Issues discussed in this course are the acquisition,</p>

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	<p>cleaning data using R. Students will work with real-world data in areas that interest them to experience exploratory data analysis at a practical level. Students will also work on skills involved in presenting results of data analysis.</p> <p>Open only to DCS students.</p> <p>Prerequisite: TECH 200 or permission of the instructor</p>	<p>cleaning, manipulation, transformation, and analysis of data obtained from a variety of sources. Topics include R programming, summarizing data numerically and graphically, categorical data, higher dimensional data, making and testing conjectures about data, and presenting results. Prerequisite(s): DATA 200 or permission of the instructor. Spring Only</p>
<p>5 – mathematical simulation and modeling using Python</p>	<p>TECH 430 Modeling and Simulation</p> <p>Students will describe and simulate real-world systems, as an introduction to physical modeling. Python will be used to refine fundamental programming skills. Applications from business and science will be explored along with the ethical issues inherent in using computational technology to look for solutions.</p> <p>Prerequisites: TECH 220 or CMSCI 120 or permission of the instructor</p>	<p>NA</p>

Certificate Elective (1 course, 3 credits)

Choose one of the below.

New course:

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TECH 440

Capstone in Computational Technology

The capstone project leverages technology skills taught throughout the major to complete a large-scale project in an area of interest to the student. Students will engage in discussion and reflection on issues of data ethics. Open only to DCS students.

Existing courses:

- BIOL 245 - Epidemiology
- BIOCH 406 - Advanced Biomedical Analysis
- BUS 347 - Data Mining I
- CJUST 319 - Cyber Forensics
- CJUST 400 - Criminal Justice Research Methods
- CJUST 410 - Data Analysis
- HSRV 305 - Program Evaluation
- PSCI 355 - Political Research Methods and Anal
- PSCI 360 - Political Analysis
- PSYCH 399 - Research
- PSYCH 498 - Senior Methods Seminar
- PSYCH 601 - Research Design, Measurement and Da
- SOC 403 - Methods of Social Research
- SOC 404 - Statistics
- SPED 433 - Assessment in Special Education
- Other approved discipline-specific data/computing course

5. Describe how general education requirements will be met, if applicable

General education requirements are met through the core curriculum at MSMU and remain unchanged.

6. Identify any specialized accreditation or graduate certification requirements for this program and its students

Not applicable

7. If contracting with another institution or non-collegiate organization, provide a copy of the written contract

Not applicable

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8. Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.

Clear, complete, and timely information regarding the curriculum, course sequence and requirements, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies will be provided in the Undergraduate Catalog. Additional information will be available on the MSMU website and be available in marketing materials. Creation of all Undergraduate Catalog and marketing content is under the supervision of the Dean of the School of Natural Science and Mathematics and Department Chair in Mathematics and Computer Science.

9. Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.

All electronic and print advertising, recruiting, and admissions materials clearly and accurately represent the program and services available. The admissions and recruitment staff are all extremely knowledgeable about the programs. All materials are reviewed by program coordinator/department chairs/deans prior to dissemination and list clearly the program, admissions requirements and contact information.

H. Adequacy of Articulation (as outlined in COMAR 13B.02.03.19.):

1. Course equivalencies are currently being worked out with Frederick Community College, Montgomery College and the Community College of Baltimore County.

I. Adequacy of Faculty Resources (as outline in COMAR 13B.02.03.11):

1. Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faculty member will teach in the proposed program.

The Department of Mathematics and Computer Science currently has 11 full-time faculty members with graduate degrees in mathematics, computer science, data science, and

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cybersecurity. Faculty will develop and teach these courses in line with their expertise. In addition, adjunct instructors will be hired as necessary to teach additional courses, using the same rigorous hiring process as currently used for adjuncts instructors teaching in the department.

Department Chair					
Dr. Jonelle Hook	PhD	Mathematics	Full-time	Associate Professor	
Faculty					
Dr. Melanie Butler	PhD	Mathematics	Full-time	Professor	TECH 200, TECH 210, TECH 220, TECH 240, TECH 300, TECH 310, TECH 410, TECH 430, TECH 440
Dr. Matt Gerhart	PhD	Mathematics	Full-time	Assistant Professor	TECH 210, TECH 310, TECH 410, TECH 430
Dr. Jon McCurdy	PhD	Data Science	Full-time	Assistant Professor	TECH 400
Dr. Ruth Lamprecht	PhD	Computer Science	Full-time	Assistant Professor	TECH 230, TECH 320, TECH 400, TECH 420
Dr. Daniel Salinas-Duron	PhD	Data Science	Full-time	Endowed Professor	TECH 400,
Dr. Brian Heinold	PhD	Mathematics	Full-time	Associate Professor	
Professor Scott Weiss	MS	Computer Science	Full-time	Assistant Professor	TECH 230, TECH 320, TECH 420
Professor Kevin Rittie	MS	Cybersecurity	Full-time	Assistant Professor	TECH 420
Dr. Nadun Kulasekera Mudiyansele	PhD	Mathematics	Full-time	Assistant Professor	TECH 200, TECH 210, TECH 220, TECH 230, TECH 300, TECH 310, TECH 320, TECH 410, TECH 430, TECH 440
Professor Margaret Leary		Cybersecurity	Full-time	Assistant Professor	TECH 420

2. Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:

a. Pedagogy that meets the needs of the students

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The Center for Instructional Design and Delivery will provide training in effective pedagogy for advanced programs of study and for online delivery. This training will be conducted in collaboration with the Chair to ensure that content and pedagogy are appropriately integrated for this highly specialized course of study.

b. The learning management system

Mount St. Mary's University uses Canvas as the learning management system. The Center for Instructional Design and Delivery will provide mandatory Canvas training, including compliance and accessibility, for all instructors in the program.

c. Evidenced-based best practices for distance education, if distance education is offered

The Center for Instructional Design and Delivery will provide training in effective pedagogy for online programs of study. This training will be conducted in collaboration with the Chair to ensure that content and pedagogy are appropriate for an online course of study.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12):

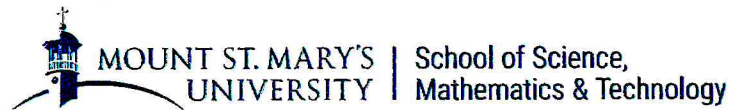
1. Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.

Mount St. Mary's University's Phillips Library has adequate resources to support the introduction and continuation of Computational Technology. Because this program is to be implemented within existing institutional resources, no additional library acquisitions are required. The Phillip's Library maintains a collection of 218,000 volumes with over 25,000 print and electronic journals. The Mount St. Mary's print collection in LC Class Q contains 8,330 titles and in R 2,013 titles.

Additionally Mount St. Mary's is a member of the Maryland Digital Library and Maryland Interlibrary Consortium which further expands resources to include a vast library of full-text electronic journals and books. The library's consortium partners recently purchased the ESCO Discovery Service to provide simultaneous Google-like searching for all databases. Mount St. Mary's also has an agreement with the National Cancer Institute (NCI) Frederick campus wherein any Mount St. Mary's student or faculty member visiting the NCI-Frederick library has full access to all NCI-Frederick holdings, either in person or by interlibrary loan using OCLC. The University also has access to JSTOR, perhaps the most applicable digital online resource for the proposed concentration.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment (as outlined in COMAR 13B.02.03.13):

Undergraduate Certificate in Computational Technology



1. Provide assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff, and faculty offices, and laboratories for studies in the technologies and sciences.

The Computational Technology certificate program will be offered through MSMU's Emmitsburg and Frederick Campus locations. As part of the Mathematics and Computer Science department, the Computational Technology certificate program will have access to the Coad Science Building facilities utilized by the program. Coad is a 48,000 ft² building that holds classrooms, faculty and staff offices, specialized laboratories, a vivarium, a computer lab, and a greenhouse. The existing computer laboratory space was recently renovated to expand utilization for the new Cybersecurity major. Those renovations were done with data science and computer science needs in mind as well and will provide access to servers that can be leveraged for any custom software or data access needs by the program.

The Frederick Campus is a 25,000 ft² facility with classrooms, offices, large conference room, two dining areas, chapel, and kitchen. Although it is a technical program, laboratory facilities are not needed at this site. Faculty instructors have access to the full resources of the facility including photocopiers, scanners, audio-visual equipment, phones, and office supplies. Administrative assistants provide administrative support and faculty also may avail themselves of the resources of the MSMU Career Center, Learning Services, Information Technology Support Center, and Health and Wellness Center.

Numerous online data and programming resources are available and will be leveraged throughout the curriculum. Participants will be expected to provide their own computer. Software leveraged will be predominately open-source programming languages such as Python and R with integration to a variety of readily available open-source tools like Spark, Hadoop, Shiny, MySQL, etc. Governments across the country and around the world have numerous OpenData database sources readily available for access and analysis. Interfaces with existing websites through API's, including a variety of social media sites, will be leveraged by participants.

In summary, this program can be offered with existing institutional resources and infrastructure.

2. Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:

a. An institution electronic mailing system

All faculty, staff and students will have access to Outlook, the University's email platform. In addition, all faculty, staff and students will have access to J1 Portal, the University's platform for housing FERPA protected data.

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b. A learning management system that provides the necessary technological support for distance education.

Mount St. Mary's University uses Canvas as the LMS. All faculty, staff and students will have access to and be trained in Canvas.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR13B.02.03.14)

1. Complete Table 1: Resources and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.

TABLE 1: RESOURCES					
Resources Categories	Year 1 (2025-2026)	Year 2 (2026-2027)	Year 3 (2027-2028)	Year 4 (2028-2029)	Year 5 (2029-2030)
1. Reallocated Funds	\$0	\$0	\$0	\$0	\$0
2. Tuition/Fee Revenue (c+g)	\$0	\$0	\$0	\$0	\$0
a. # F.T. Students					
b. Annual Tuition/ Fee Rate (Discounted rate)					
c. Annual Full Time Revenue (a x b)					
d. # Part Time Students	3	6	9	12	15
e. Credit Hour Rate	\$570	\$570	\$570	\$570	\$570
f. Annual Credit Hours	6	6	6	6	6
g. Total Part Time Revenue (d x e x f)	\$10,260	\$20,520	\$30,780	\$41,040	\$51,300
3. Grants, Contracts, & Other External Sources					
4. Other Sources					
TOTAL (Add 1-4)	\$10,260	\$20,520	\$30,780	\$41,040	\$51,300

Credit Hour Rate: The rate for AUG MSMU courses in 2024-25 is \$570 per credit. It is difficult to predict future tuition increases exactly, but typically do not surpass 2-5% annually.

2. Complete Table 2: Program Expenditures and Narrative Rationale. Provide finance data for the first five years of program implementation. Enter figures into each cell and

Undergraduate Certificate in Computational Technology



provide a total for each year. Also provide a narrative rationale for each expenditure category.

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$0	\$0	\$0	\$0	\$0
a. # FTE					
b. Total Salary					
c. Total Benefits					
2. Admin. Staff (b+c below)					
a. # FTE					
b. Total Salary					
c. Total Benefits					
3. Support Staff (b+c below)	\$3,350	\$3,417	\$3,485	\$3,555	\$3,626
a. # FTE	0.05	0.05	0.05	0.05	0.05
b. Total Salary	\$2,500	\$2,550	\$2,601	\$2,653	\$2,706
c. Total Benefits	\$850	\$867	\$884	\$902	\$920
4. Equipment					
5. Library		\$2000	\$2100	\$2200	\$2300
6. New or Renovated Space					
7. Other Expenses (see Table 3)	\$0	\$0	\$0	\$0	\$0
8. TOTAL (Add 1 – 7)	\$3,350	\$3,417	\$3,485	\$3,555	\$3,626

Since the program uses existing courses and faculty or courses in the proposed Computational Technology major, there are very few expenses associated with the certificate.

Support Staff: We estimate a time commitment equivalent to 5% of a person's workload in the Communications Office for marketing and promotion. A salary of \$50,000 was assumed and benefits are 34% of the salary. The salary was incremented by 2% per year.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15):

1. Discuss procedures for evaluating courses, faculty and student learning outcomes.

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Each course will have tailored learning outcomes based upon the above-mentioned learning outcomes. Courses will be approved by the faculty as part of the initial program approval process at the university. Faculty will be evaluated in accordance with MSMU's Shared Governance procedure including regular course evaluations and observations by the Chair. Student learning outcomes and department goals are aligned with the University's mission and strategic goals.

2. Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

All the programs in the School of Natural Science and Mathematics at Mount St. Mary's University engage in a cycle of continuous improvement. Student Learning Assessment Summary (SLAS) forms are completed annually by the Department Chair. A comprehensive annual review of the Computational Technology certificate will include data related to faculty satisfaction (as per regular data retreats), student satisfaction (as per course evaluations and program computer surveys), and cost effectiveness (as per program efficiency and effectiveness metrics provided by the Provost).

N. Consistency with the State's Minority Student Achievement Goals (as outlined in COMAR 13B.02.03.05):

1. Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.

The proposed certificate in Computational Technology is aligned to Maryland's Minority Achievement Goals and the goals and strategic plan of Mount St. Mary's University. MSMU is committed to recruiting and supporting minority and educationally disadvantaged students. The Mount has a long-standing commitment to diversity, and equity. These needs include intentional efforts through targeted marketing, financial assistance, and ease of transfer credits from community colleges.

O. Relationship to Low Productivity Programs Identified by the Commission:

1. If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.

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Not Applicable

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22):

1. Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.

Mount St. Mary's University is NC-SARA approved. See Appendix A.

2. Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.

Mount St. Mary's University, as per full NC-SARA accreditation, complies with all C-RAC guidelines. See Appendix A which is our NC-SARA acceptance email.

Undergraduate Certificate in Computational Technology



MOUNT ST. MARY'S UNIVERSITY | School of Science,
Mathematics & Technology

APPENDIX A

From: NC-SARA info@nc-sara.org

Sent: Friday,
August 23, 2019

11:09 AM **To:**
Frazier, Laura

frazier@msmary.edu

Subject: SARA
Annual Membership
Approval: Payment
and Verification

Congratulations!

Mount St. Mary's University has been approved to participation in SARA! In order to complete the process and ensure participation, **please use the link below to verify information and for payment of the NC-SARA annual fee:**

Payment registration

http://ncsara.force.com/institutions/InstitutionPaymentForm?id=001360000078Z6o&contact=0031R0_0002ABlr

If you have any questions or issues, please don't hesitate to contact us at

info@nc-sara.org. Have a great day!

NC-SARA Staff



Office Use Only: PP#

**Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program**

Institution Submitting Proposal	Mount St. Mary's University
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Each action below requires a separate proposal and cover sheet.

- | | |
|--|---|
| <input type="radio"/> New Academic Program | <input type="radio"/> Substantial Change to a Degree Program |
| <input type="radio"/> New Area of Concentration | <input type="radio"/> Substantial Change to an Area of Concentration |
| <input type="radio"/> New Degree Level Approval | <input type="radio"/> Substantial Change to a Certificate Program |
| <input checked="" type="radio"/> New Stand-Alone Certificate | <input type="radio"/> Cooperative Degree Program |
| <input type="radio"/> Off Campus Program | <input type="radio"/> Offer Program at Regional Higher Education Center |

Payment Submitted: <input checked="" type="radio"/> Yes	Payment Type: <input type="radio"/> R*STARS # 27541	Payment Amount: \$250	Date Submitted: 021825
Submitted: <input type="radio"/> No	Type: <input type="radio"/> Check # 27541		

Department Proposing Program	Math and Computer Science		
Degree Level and Degree Type	Upper division certificate		
Title of Proposed Program	Computational Technology		
Total Number of Credits	18		
Suggested Codes	HEGIS: 799.00	CIP: 30.3001	
Program Modality	<input type="radio"/> On-campus <input type="radio"/> Distance Education (fully online) <input checked="" type="radio"/> Both		
Program Resources	<input checked="" type="radio"/> Using Existing Resources <input type="radio"/> Requiring New Resources		
Projected Implementation Date <small>(must be 60 days from proposal submission as per COMAR 13B.02.03.03)</small>	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer Year: 2025		
Provide Link to Most Recent Academic Catalog	URL: https://catalog.msmary.edu/?_gl=1*1v76jr4*_gcl_au*ODI0NTY5MjMuMTczNzk4NjJwOA..		
Preferred Contact for this Proposal	Name:	Christine McCauslin, Ph.D.	
	Title:	Dean, School of Science, Mathematics & Technology	
	Phone:	(301) 447-8399	
	Email:	mccauslin@msmary.edu	
President/Chief Executive	Type Name:	Gerard J. Joyce, Ph.D.	
	Signature:	Date:	
	Date of Approval/Endorsement by Governing Board:		

Revised 1/2021

